Docket No. YOR920030271US1 *PATENT*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: **Bigus et al.**	§	
	§	Group Art Unit: **2129**
Serial No. **10/670,149**	§	
	§	Examiner: **Tran, Mai T.**
Filed: **September 24, 2003**	§	
	§	
For: **Apparatus and Method for Monitoring System Health Based on Fuzzy Metric Data Ranges and Fuzzy Rules**	§	
	§	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

35526
PATENT TRADEMARK OFFICE
CUSTOMER NUMBER

APPEAL BRIEF (37 C.F.R. 41.37)

This brief is in furtherance of the Notice of Appeal, filed in this case on January 11, 2007.

A fee of $500.00 is required for filing an Appeal Brief. Please charge this fee to IBM Corporation Deposit Account No. 50-0510. No additional fees are believed to be necessary. If, however, any additional fees are required, I authorize the Commissioner to charge these fees which may be required to IBM Corporation Deposit Account No. 50-0510. No extension of time is believed to be necessary. If, however, an extension of time is required, the extension is requested, and I authorize the Commissioner to charge any fees for this extension to IBM Corporation Deposit Account No. 50-0510.

REAL PARTY IN INTEREST

The real party in interest in this appeal is the following party: International Business Machines Corporation of Armonk, New York.

RELATED APPEALS AND INTERFERENCES

With respect to other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal, there are no such appeals or interferences.

STATUS OF CLAIMS

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

Claims in the application are: 1-5, 7-13, 15-21, and 23-27.

B. STATUS OF ALL THE CLAIMS IN APPLICATION

1. Claims canceled: 6, 14, and 22.
2. Claims withdrawn from consideration but not canceled: None.
3. Claims pending: 1-5, 7-13, 15-21, and 23-27.
4. Claims allowed: None.
5. Claims rejected: 1-5, 7-13, 15-21, and 23-27.
6. Claims objected to: None.

C. CLAIMS ON APPEAL

The Claims on appeal are: 1-5, 7-13, 15-21, and 23-27.

STATUS OF AMENDMENTS

No amendments were submitted after the Final Office Action of November 22, 2006.

SUMMARY OF CLAIMED SUBJECT MATTER

A. CLAIM 1 - INDEPENDENT

Claim 1 is directed to a computer-implemented method of determining a health of a computing system component (Specification, p. 9, ll. 3-7; and Figure 5, all elements). One or more fuzzy data set associated with at least one measured metric of the computing system component are generated (Specification, p. 18, ll. 16-25; p. 27, ll. 5-11; Figure 4, 410; and Figure 8, 480). The fuzzy data set defines fuzzy regions indicating different categories of the measured metric (Specification, p. 13, ll. 7-21; p. 18, ll. 16-25; and p. 20, ll. 3-15). A fuzzy rule set associated with the measured metric is generated (Specification, p. 19, ll. 8-20; and Figure 4, all elements). The fuzzy rule set defines a relationship between the fuzzy regions of the fuzzy data set and component health categories of the computing system (Specification, p. 19, l. 15-p.20, l. 23; p. 21, ll. 5-14). The computing system outputs the health of the component based on the at least one fuzzy data set and the at least one fuzzy rule set (Specification, p. 21, l. 15-p.22. l. 2).

B. CLAIM 9 – INDEPENDENT

Claim 9 is directed to a computer program product in a recordable-type medium for determining a health of a computing system component (Specification, p. 9, ll. 3-7; p. 28, l. 23-p. 29, l. 3; and Figure 5, all elements). The computer program product includes instructions for generating a fuzzy data set associated with a measured metric of the computing system component (Specification, p. 18, ll. 16-25; p. 27, ll. 5-11; Figure 4, 410; and Figure 8, 480). The fuzzy data set defines fuzzy regions indicating different categories of the measured metric (Specification, p. 13, ll. 7-21; p. 18, ll. 16-25; and p. 20, ll. 3-15). The computer program product further includes second instructions for generating at least one fuzzy rule set associated with the at least one measured metric (Specification, p. 19, ll. 8-20; and Figure 4, all elements). The fuzzy rule set defines a relationship between the fuzzy regions of the fuzzy data set and component health categories of the computing system (Specification, p. 19, l. 15-p.20, l. 23; p. 21, ll. 5-14). The computer program product further includes third instructions for outputting the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set (Specification, p. 21, l. 15-p.22. l. 2).

C. CLAIM 16 – DEPENDENT

Claim 16 is directed to the computer program product of claim 15. The fuzzy rule set includes a hedge (Specification, p. 20, ll. 3-15; and p. 16, ll. 3-12). A means (Specification, p. 26, ll. 15-24; and Figures 8-10, all elements) for determining a fuzzy data set in which the metric data is classified includes a means (Specification, p. 26, ll. 15-24; and Figures 8-10, all elements) for applying at least one hedge algorithm associated with the at least one hedge to the metric data (Specification, p. 20, ll. 3-15). Claim 15 is directed to the computer program product of claim 9, The third instructions for determining the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set includes instructions for applying the at least one fuzzy rule set to metric data collected by a metric data collection facility (Specification, p. 19, l. 12-p. 21, l. 22). The third instructions further include determining a fuzzy data set in which the metric data is classified based on the application of the at least one fuzzy rule set (Specification, p. 21, ll. 5-14; p. 27, ll. 12-20; and Figure 9, all elements).

D. CLAIM 17 – INDEPENDENT

Claim 17 is directed to an apparatus for determining a health of a computing system component (Specification, p. 9, ll. 3-7; and Figure 5, all elements). The apparatus includes a means (Specification, p. 26, ll. 15-24; and Figures 8-10, all elements) for generating at least one fuzzy data set associated with at least one measured metric of the computing system component (Specification, p. 18, ll. 16-25; p. 27, ll. 5-11; Figure 4, 410; and Figure 8, 480). The fuzzy data set defines fuzzy regions indicating different categories of the measured metric (Specification, p. 13, ll. 7-21; p. 18, ll. 16-25; and p. 20, ll. 3-15). The apparatus further includes a means (Specification, p. 26, ll. 15-24; and Figures 8-10, all elements) for generating at least one fuzzy rule set associated with the at least one measure metric (Specification, p. 19, ll. 8-20; and Figure 4, all elements), wherein the fuzzy rule set defines a relationship of the fuzzy regions of the fuzzy data set to categories of computing system component health (Specification, p. 19, l. 15-p.20, l. 23; p. 21, ll. 5-14). The apparatus further includes a means (Specification, p. 26, ll. 15-24; and Figures 8-10, all elements) for outputting the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set (Specification, p. 21, l. 15-p.22. l. 2).

E. CLAIM 24 – DEPENDENT

Claim 24 is directed to the apparatus of claim 23, wherein the at least one fuzzy rule set includes at least one hedge (Specification, p. 20, ll. 3-15; and p. 16, ll. 3-12) and wherein the means (Specification, p. 26, ll. 15-24; and Figures 8-10, all elements) for determining a fuzzy data set in which the metric data is classified includes means (Specification, p. 26, ll. 15-24; and Figures 8-10, all elements) for applying at least one hedge algorithm associated with the at least one hedge to the metric data (Specification, p. 20, ll. 3-15). Claim 23 is directed to the apparatus of claim 17, wherein the means for determining the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set includes a means for applying the at least one fuzzy rule set to metric data collected by a metric data collection facility (Specification, p. 19, l. 12-p. 21, l. 22), and a means for determining a fuzzy data set in which the metric data is classified based on the application of the at least one fuzzy rule set (Specification, p. 21, ll. 5-14; p. 27, ll. 12-20; and Figure 9, all elements).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection to review on appeal are as follows:

A. GROUND OF REJECTION 1 (Claims 1-24)

Whether claims 1-24 fail to be anticipated by *Arnold et al*, U.S. Patent No. 5,822,301, (hereafter "*Arnold*") under 35 U.S.C. § 102(b).

B. GROUND OF REJECTION 2 (Claims 25-27)

Whether the Examiner failed to state a *prima facie* obviousness rejection of claims 25-27 over *Arnold* in view of "Applying Neural Networks to Computer System Performance Tuning" by Joseph P. Bigus, (hereinafter "*Bigus*") under 35 U.S.C. § 103(a).

ARGUMENT

A. GROUND OF REJECTION 1 (Claims 1-24)

The Examiner rejects claims 1-24 as anticipated over *Arnold.* Applicants request that the Board of Patent Appeals and Interferences overturn this rejection and direct the Examiner to allow the claims. Applicants note that the rejection is directed towards claims 1-24; however, claims 6, 14 and 22 have been cancelled. Therefore, Applicants have not addressed these claims in this Appeal Brief.

A.1. Claims 1-5, 7, 9-13, 15, 17-21, 23

A.1.i. Refutation of Asserted Anticipation

Claim 1 is a representative claim of this grouping of claims. Claim 1 is as follows:

> 1. A computer-implemented method of determining a health of a computing system component, the computer-implemented method comprising:
>
> generating at least one fuzzy data set associated with at least one measured metric of the computing system component, wherein the fuzzy data set defines fuzzy regions indicating different categories of the measured metric;
>
> generating at least one fuzzy rule set associated with the at least one measure metric, wherein the fuzzy rule set defines a relationship of the fuzzy regions of the fuzzy data set to categories of computing system component health; and
>
> outputting the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set.

The Examiner asserts the following with respect to claim 1:

> Claim 1
>
> Arnold teaches a computer-implemented method of determining a health of a computing system component, the computer-implemented method comprising:
>
> generating at least one fuzzy data set associated with at least one measured metric of the computing system component, wherein the fuzzy data set defines fuzzy regions indicating different categories of the measured metric (col. 3, lines 22-46);
>
> generating at least one fuzzy rule set associated with the at least one measure metric, wherein the fuzzy rule set defines a relationship of the fuzzy regions of the fuzzy data set to categories of computing system component health (col. 3, lines 22-46); and

> outputting the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set (col. 4, lines 8-14, specifically lines 11-12 where it stated "a reliable statement about the respective condition of the network", col. 8, lines 8-17).

Final Office Action dated November 22, 2006, pp. 2-3.

A prior art reference anticipates the claimed invention under 35 U.S.C. § 102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). All limitations of the claimed invention must be considered when determining patentability. *In re Lowry*, 32 F.3d 1579, 1582, 32 U.S.P.Q.2d 1031, 1034 (Fed. Cir. 1994). Anticipation focuses on whether a claim reads on the product or process a prior art reference discloses, not on what the reference broadly teaches. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983). In this case each and every feature of the presently claimed invention is not identically shown in the cited reference, arranged as they are in the claims.

Arnold does not anticipate claim 1 because *Arnold* does not teach either of the features "generating at least one fuzzy data set associated with at least one measured metric of *the computing system component*," or "outputting the health of the *computing system component* based on the at least one fuzzy data set and the at least one fuzzy rule set," as recited in claim 1. The Examiner asserts otherwise, citing the following portions of *Arnold* as teaching these features of claim 1:

> Measured values to be acquired are at least respectively determined for: Performance (transmission capacity, transmission costs, transmission time); Time Behavior (delay time between two nodes, time change of the delay time between two nodes); and Dependability (connection dependability, node dependability, packet dependability.
>
> The measured values are processed with fuzzy logic, in that they are treated like linguistic variables whose satisfaction degrees are identified using affiliation functions, in that at least one fuzzy rule set is employed for each of the evaluation categories. The evaluation criterion for the respective communication connection is formed with two-time application of fuzzy logic, in that the satisfaction degrees for the individual evaluation categories are processed with fuzzy logic, whereby they are handled as linguistic variables that are evaluated using at least one principal fuzzy rule set. In a further embodiment at least respective rule sets that operate

> the following variables with one another are employed: costs of the communication connection with its transmission capacity; transmission time with the costs of the communication connection; delay time between two nodes with the time change of the delay time between two nodes; and connection dependability of the communication connection with its packet dependability.

Arnold, col. 3, ll. 22-46.

> A plurality of measured quantities are beneficially acquired in the determination of the measured parameters, that is, the routing metrics for the individual evaluation categories since a reliable statement about the respective condition of the network can thus be made. It also thus becomes possible to weight the individual measured quantities and balance them relative to one another.

Arnold, col. 3, ll. 22-46.

> For example, this weighting represents an evaluation number from the interval, 0, 1. A number close to 1, for example, thereby denotes a very good evaluation and a number close to 0, analogously thereto, denotes a very poor evaluation. This weighting can then be directly employed as input for an algorithm Sho that calculates the shortest connection on the basis of the weighting WEIG.
>
> For example, this weighting is made available via the processor PRO1 as g_L at an output of the evaluation system.

Arnold, col. 8, ll. 8-17.

Nothing in the cited portions of *Arnold* or any other portion of *Arnold* teaches or discloses the features, "generating at least one fuzzy data set associated with at least one measured metric of *the computing system component*," or "outputting the health of the *computing system component* based on the at least one fuzzy data set and the at least one fuzzy rule set." *Arnold* teaches that communication connections can be evaluated using fuzzy rule sets. At least one measured value describing the connection is acquired. The measured value is then processed with fuzzy logic. Potential communications connections are then evaluated and selected based on the optimum fuzzy logic evaluation.

However, this teaching of *Arnold* differs from the claimed step of "determining the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set," because this claimed step determines the health of a computing system

component. In *Arnold*, the fuzzy logic is used to evaluate different communication connections. However, a communication connection as in *Arnold* is not the same as a computing system, as claimed. Likewise, the health of a computing system, as claimed, is not the same as evaluating the quality of a communications connection, as in *Arnold.*

The Examiner has the burden of proving otherwise. Because the Examiner has not met this burden, the Examiner has not established that the teachings of *Arnold* and the features of claim 1 are equivalent. Hence, the Examiner has not shown that *Arnold* anticipates claim 1.

Additionally, the health of a computing system component is not the same as the selection of a particular communication connection. Thus, *Arnold* does not teach all of the features of claim 1. Consequently, the rejection is in error and should be reversed. Accordingly, claim 1 and the remaining claims in this grouping of claims should be allowed.

A.1.ii. Rebuttal of the Examiner's Response

In response to the above facts, the Examiner states the following:

> Second, in response to applicants' argument that "a communication connection, as in Arnold is not the same as a computing system as claimed." Applicants are reminded that during patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See *In re Morris*, 127, F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). Applicants correctly stated Arnold teaches the communication connections can be evaluated using fuzzy logic rule sets. Examiner asserts the communication connections in communication network of Arnold to read on a computing system component as claimed since the communications networks are complex systems that contain several thousand components i.e. computing system component.

Final Office Action dated November 22, 2006, p. 7.

While the Examiner sets forth the correct standard for examination of the claims under *In re Morris*, the Examiner fails to correctly apply that standard. Key to the evaluation under *In re Morris* is whether the interpretation that the Examiner subscribes to the claims is consistent with the teaching of the specification. The Examiner has gone beyond the teachings of the specification in including the communications networks of *Arnold* within the scope of claim 1.

The Examiner's assertion regarding *Arnold* is found in the following passage:

> The expansion of available communication networks is rapidly progressing world-wide. As an example, let the Internet be cited. In such communication networks, parties to the communication can be connected on various communication paths via different relay stations. Such communication networks are highly complex systems that, for example, contain several thousand components. Great significance is therefore accorded the routing function of the network which selects each connection from one component to the other component in the network via which a message is to be transported. In the ISO-OSI reference model for communication networks, the selection of the best communication connection between a transmitting node and a destination node is one of the principal functions of the third layer. The problem of finding the best possible connection for a communication participant arises in every network that does not allow a transmitter to connect directly to a receiver with a single transmission connection but where, instead, a plurality of intermediate communication paths must be bridged. The routing problem in networks therefore represents an archetypical, combinatorial optimization problem for such multi-node networks.

Arnold, col. 8, ll. 8-17.

A network simply is not a device as in claim 1. While a network may be comprised of a number of different devices, the network itself is an amorphous collection of these devices and their interconnections. Thus, while a device may be part of a network, the "communication network" is not a computing device. To use the example of *Arnold*, a computing device is not the Internet. *Arnold*'s "communication network" is therefore inconsistent with Applicant's teaching in the specification regarding what comprises a "computing system."

The Examiner further states the following:

> Third, in response to applicants' argument that "the health of a computing system", as claimed, is not the same as evaluating the quality of a communications connection, as in Arnold. Arnold teaches in col. 4, lines 8-14, specifically lines 11-12 where it stated "a reliable statement about the respective condition of the network" to read on "the health of a computing system."

Final Office Action dated November 22, 2006, p. 8.

Similar to the Examiner's statements above, the Examiner has gone beyond the teachings of Applicant's specification by likening a "reliable statement about the respective condition of the network" to the "health of a computing system."

As shown above, *Arnold*'s network is not the Applicant's computing system. Furthermore, *Arnold*'s "condition of the network" is not consistent with the Applicant's "health of the computing system." With regard to *Arnold*'s "reliable statement about the respective condition of the network," the Examiner cites:

> A plurality of measured quantities are beneficially acquired in the determination of the measured parameters, that is, the routing metrics for the individual evaluation categories since a reliable statement about the respective condition of the network can thus be made. It also thus becomes possible to weight the individual measured quantities and balance them relative to one another.

Arnold, col. 4, ll. 8-14.

The "condition of the network" comprises several variables, all of which are related to the elapsed time and reliability for sending packets from one network device to another. As stated in *Arnold*:

> In the inventive method, these recited parameters are advantageously combined in three evaluation categories. For example, they serve the inventive method as input variables for a two-stage fuzzy system that determines a weighted connection length. The following three groups are advantageously formed:
>
> 1. "Capacity", "costs" and "transmission time" are combined, for example, to form the group of performance criteria.
>
> 2. "Delay time" and the "change in the delay time" are combined, for example, as criteria of the time behavior of the connection.
>
> 3. The three quantities "dependability of the connection", "failsafe dependability of the neighboring node" and the "packet loss probability" are combined, for example, to form the group of dependability criteria. The inventive method is thereby designed such that no specifically existing computer network must form the basis of its functioning

Arnold, col. 7, ll.23-42.

Thus *Arnold*'s "condition of the network" only teaches time and reliability of the network connections. That is, the "condition of the network" is concerned with the interconnections between the various network nodes. On the other hand, the Applicant's health of the computer system comprises processor workload type metrics, and is not concerned with the network speed and reliability of *Arnold*. As stated in the specification, Applicant's workload type metrics

include, for example, processor utilization, page fault rates, number of threads, number of hits on a web site, number of database queries, number of database connections, and other similar metrics indicating the workload and/or resource utilization of the computer system. While these features are not explicitly claimed in claim 1, the description in the specification shows that the Examiner's interpretation of claim 1 is not consistent with the specification.

Because the Examiner's interpretation of claim 1 as including the communications networks of *Arnold* exceeds "the broadest reasonable interpretation consistent with the specification," the Examiner's current rejection is improper. Accordingly, Applicants request that the Board of Patent Appeals and Interferences overturn the rejection with respect to this grouping of claims.

A.2. Claim 8, 16, 24

Claim 8 is a representative claim of this grouping of claims. Claim 8 is as follows:

> 8. The method of claim 7, wherein the at least one fuzzy rule set includes at least one hedge and wherein determining a fuzzy data set in which the metric data is classified includes applying at least one hedge algorithm associated with the at least one hedge to the metric data.

The Examiner asserts the following regarding claim 8:

> Arnold teaches the method of claim 7, wherein the at least one fuzzy rule set includes at least one hedge and wherein determining a fuzzy data set in which the metric data is classified includes applying at least one hedge algorithm associated with the at least one hedge to metric data (col. 9, lines 49-56).

Final Office Action dated November 22, 2006, pp. 7-8.

A prior art reference anticipates the claimed invention under 35 U.S.C. § 102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). All limitations of the claimed invention must be considered when determining patentability. *In re Lowry*, 32 F.3d 1579, 1582, 32 U.S.P.Q.2d 1031, 1034 (Fed. Cir. 1994). Anticipation focuses on whether a claim reads on the product or process a prior art reference

discloses, not on what the reference broadly teaches. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983). In this case each and every feature of the presently claimed invention is not identically shown in the cited reference, arranged as they are in the claims.

Claim 8 depends from claim 1. Each distinction between *Arnold* and claim 1 as shown above applies to claim 8 as well. Therefore, *Arnold* does not anticipate claim 8 at least for the reasons presented above.

Additionally, *Arnold* does not anticipate claim 8 because *Arnold* does not teach the feature "wherein the at least one fuzzy rule set *includes at least one hedge* and wherein determining a fuzzy data set in which the metric data is classified includes *applying at least one hedge algorithm* associated with the at least one hedge to metric data," as recited in claim 8. The Examiner asserts otherwise, citing the following portions of *Arnold* as teaching the features of claim 8:

> Particularly in the field of computer networks, the formulation of the rules is a heuristic and subjective event because the rules can look completely different dependent on the aim of the designer. This results in the fact that a person skilled in the art can provide different fuzzy evaluation rules on a case-by-case basis dependent on the system to be controlled or on the networks to be evaluated.

Arnold, col. 9, ll. 49-56.

Nothing in the cited portions of *Arnold* or any other portion of *Arnold* teaches or discloses the features, "wherein the at least one fuzzy rule set *includes at least one hedge* and wherein determining a fuzzy data set in which the metric data is classified includes *applying at least one hedge algorithm* associated with the at least one hedge to metric data." *Arnold* teaches that formulation of fuzzy rule sets "is a heuristic and subjective event." The heuristic determination of *Arnold* – a trial-and-error method of problem solving used when an algorithmic approach is impractical – is on its face contrary to the plain language of claim 8. Rule formulation as claimed in claim 8 is instead governed by very predictable hedge algorithms. The use of these algorithms is the antithesis of the trial-and-error method disclosed in the cited portion of *Arnold*.

Because classifying metric data from the fuzzy data by applying at least one hedge algorithm is not the same as "a heuristic and subjective" determination of the rules, *Arnold* does

not teach all of the features of claim 8. Furthermore, *Arnold* does not teach, suggest, or give any incentive to make the needed changes to reach the presently claimed invention. Indeed, *Arnold* directly teaches away from the use of algorithms, instead relying on trial and error to formulate the evaluation rules. Because the reference fails to show that every element of the claimed invention is identically shown in that reference, the rejection of claim 8 under 35 U.S.C. §102 is in error. Thus, *Arnold* does not anticipate claim 8 or any other claim in this grouping of claims.

B. GROUND OF REJECTION 2 (Claims 25-27)

The Examiner rejects claims 25-27 as obvious over *Arnold* in view of *Bigus*.

B.1. The Proposed Combination Does Not Teach Each Claim Feature

Claim 25 is a representative claim of this grouping of claims. Claim 25 is as follows:

> 25. The computer-implemented method of claim 1 wherein the at least one measured metric is selected from the group consisting of processor utilization, page fault rates, number of threads, number of hits on a website, number of database queries, number of database connections, and combinations thereof.

The Examiner asserts the following regarding claim 25:

> Arnold teaches a method of determining a health of computing system component but fails to disclose at leas tone measured metric is selected from the group consisting of processor utilization, page fault rates, numbers of threads, number of hits on a website, number of database queries, number of database connections, and combinations thereof.
>
> Bigus teaches computer system performance tuning using key system performance measures such as deice utilizations and paging rates (Bigus, abstract).
>
> It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine the method of determining a health of a computing system component of Arnold with the key system performance measures of Bigus. The motivation for doing so would be to maximize system efficiency (Bigus, page 2442, left column, line 20).

Final Office Action dated November 22, 2006, pp. 7-8.

A *prima facie* case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 781,

783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993). All limitations of the claimed invention must be considered when determining patentability. *In re Lowry*, 32 F.3d 1579, 1582, 32 U.S.P.Q.2d 1031, 1034 (Fed. Cir. 1994). If an independent claim is non-obvious under 35 U.S.C. 103, then any claim depending therefrom is non-obvious. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). In the case at hand, not all of the features of the claimed invention have been properly considered and the teachings of the references themselves do not teach or suggest the claimed subject matter to a person of ordinary skill in the art.

The Examiner failed to state a *prima facie* obviousness rejection because neither *Arnold* nor *Bigus* teach or suggest all features of claim 1, from which claim 25 depends. As discussed above, *Arnold* does not teach either of the claimed features of "generating at least one fuzzy data set associated with at least one measured metric of *the computing system component*," or "outputting the health of the *computing system component* based on the at least one fuzzy data set and the at least one fuzzy rule set." *Bigus* teaches the applying feedforward neural networks and techniques from control systems theory to computer system performance tuning. *Bigus* does not teach or disclose "generating at least one fuzzy data set associated with at least one measured metric of *the computing system component*," or "outputting the health of the *computing system component* based on the at least one fuzzy data set and the at least one fuzzy rule set." Therefore, *Bigus* does not overcome the deficiencies of *Arnold.*

Therefore, the proposed combination of *Arnold* and *Bigus*, when considered as a whole, does not teach or suggest the features of claim 25. Neither reference teaches nor suggests "generating at least one fuzzy data set associated with at least one measured metric of *the computing system component*," or "outputting the health of the *computing system component* based on the at least one fuzzy data set and the at least one fuzzy rule set." Because the proposed combination of the references, when considered as a whole, does not teach or suggest all of the features of claim 25, the Examiner has failed to state a *prima facie* obviousness rejection against claim 25 and against the remaining claims in this grouping of claims.

B.2. No Teaching, Suggestion, or Motivation Exists to Combine the References

In addition, a *prima facie* obviousness rejection against claim 25 has not been made because no proper teaching or suggestion to combine the references has been stated. A *prima*

facie case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993). A proper *prima facie* case of obviousness cannot be established by combining the teachings of the prior art absent some teaching, incentive, or suggestion supporting the combination. *In re Napier*, 55 F.3d 610, 613, 34 U.S.P.Q.2d 1782, 1784 (Fed. Cir. 1995); *In re Bond*, 910 F.2d 831, 834, 15 U.S.P.Q.2d 1566, 1568 (Fed. Cir. 1990). No such teaching or suggestion is present in the cited references and the Examiner has not pointed out any proper teaching or suggestion that is based on the prior art.

The references themselves do not suggest the proposed advantage. In the present case, neither *Arnold* nor *Bigus* teach incorporating the parameter measurements of *Bigus* into the network communication evaluations of *Arnold*. Furthermore, the Examiner has not stated any alternative motivation for combining the references based on the general understanding of one of ordinary skill in the art. Accordingly, the Examiner has not actually stated a teaching or suggestion based on the references to combine the references. Instead, the Examiner has only put forth a hypothetical advantage of combining the references based on the Examiner's opinion, rather than on a pre-existing teaching, suggestion, or motivation found in the references themselves. Thus, the Examiner has failed to state a *prima facie* obviousness rejection against claim 25 and against any other claim in this grouping of claims.

B.3. No Motivation Exists to Combine *Arnold* and *Bigus* Because They Address Different Problems

One of ordinary skill would not combine the references to achieve the invention of claim 25 because the references are directed towards solving different problems. It is necessary to consider the reality of the circumstances – in other words, common sense – in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor. *In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992); *In re Wood*, 599 F.2d 1032, 1036, 202 U.S.P.Q. 171, 174 (CCPA 1979). In the case at hand, the cited references address distinct problems. Thus, no common sense reason exists to establish that one of ordinary

skill would reasonably be expected to look for a solution to the problem facing the inventor. Accordingly, no teaching, suggestion, or motivation exists to combine the references and the Examiner has failed to state a *prima facie* obviousness rejection of claim 25.

For example, *Bigus* is directed to solving the problem of applying feedforward neural networks and techniques from control systems theory to computer system performance tuning, and specifically whether neural networks can be successfully used to adapt the memory partition sizes of an operating system. For example, *Bigus* provides that:

> Performance tuning is a difficult control problem. The system is nonlinear, it is subjected to a wide range of disturbances (workload) and there is a large control space (4 parameters). Most of the neural network control literature has involved single input single output (SISO) systems. The simulated computer system was subjected to rather abrupt workload changes which the neural network controller had to deal with. With constant multiprogramming levels and workload, the controllers were able to configure the system (through manipulating the memory allocations) to achieve the desired response times. Even with the changing workloads, the neural network controllers were able to smooth out the system response times.

Bigus, p. 2447, col. 1, ll. 3-16.

On the other hand, *Arnold* is directed to the problem of evaluating communication connections in multi-node networks. For example, *Arnold* provides as follows:

> In general terms the present invention is a method for the evaluation of at least two multi-part communication connections in a multi-node network. At least two evaluation categories are determined for evaluating a communication connection. At least respectively one measured value that describes the connection with respect to the respective evaluation category is acquired for each determined evaluation category for a respective communication connection. An evaluation criterion is determined for the respective communication connection in that the appertaining measured values are evaluated in the form of satisfaction degrees with respect to the satisfaction of the respective evaluation category and all satisfaction degrees are operated with one another such that the communication connection that has higher satisfaction degrees with respect to the evaluation categories receives an optimum evaluation criterion.

Arnold, col. 2, l. 66-col. 3, l.14.

Based on the plain disclosures of the references themselves, the references address completely distinct problems that are unrelated to each other. The problem of successfully using neural networks to adapt to the memory partition sizes of an operating system as described in *Bigus* is completely distinct from the problem of evaluating communication connections in multi-node networks as described in *Arnold.*

Because the references address completely distinct problems, one of ordinary skill would have no reason to combine or otherwise modify the references to achieve the invention of claim 25. Thus, no proper teaching, suggestion, or motivation exists to combine the references in the manner suggested by the Examiner. Accordingly, the Examiner has failed to state a *prima facie* obviousness rejection against claim 25 and against any other claim in this grouping of claims.

C. CONCLUSION

The rejections are in error and should be overturned. Therefore, Applicants respectfully request that the Board of Patent Appeals and Interferences overturn the rejections. Additionally, Applicants request that the Board direct the Examiner to allow the claims.

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CLAIMS APPENDIX

The text of the claims involved in the appeal is as follows:

1. A computer-implemented method of determining a health of a computing system component, the computer-implemented method comprising:

generating at least one fuzzy data set associated with at least one measured metric of the computing system component, wherein the fuzzy data set defines fuzzy regions indicating different categories of the measured metric;

generating at least one fuzzy rule set associated with the at least one measure metric, wherein the fuzzy rule set defines a relationship of the fuzzy regions of the fuzzy data set to categories of computing system component health; and

outputting the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set.

2. The method of claim 1, wherein the at least one fuzzy data set is generated by performing data mining on metric history data, wherein the metric history data includes measured values for the at least one measured metric for a predetermined period of time.

3. The method of claim 2, wherein the data mining includes performing statistical analysis of the metric history data to determine the distribution of the metric history data.

4. The method of claim 1, further comprising:

generating at least one second fuzzy rule set indicating a relationship of the health of the computing system component to the health of at least one other computing system component.

5. The method of claim 1, further comprising:

generating an indicator of the health of the at least one computing system component; and

outputting the indicator.

7. The method of claim 1, wherein determining the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set includes:

applying the at least one fuzzy rule set to metric data collected by a metric data collection facility; and

determining a fuzzy data set in which the metric data is classified based on an application of the at least one fuzzy rule set.

8. The method of claim 7, wherein the at least one fuzzy rule set includes at least one hedge and wherein determining a fuzzy data set in which the metric data is classified includes applying at least one hedge algorithm associated with the at least one hedge to the metric data.

9. A computer program product in a recordable-type medium for determining a health of a computing system component, the computer program product comprising:

first instructions for generating at least one fuzzy data set associated with at least one measured metric of the computing system component, wherein the fuzzy data set defines fuzzy regions indicating different categories of the measured metric;

second instructions for generating at least one fuzzy rule set associated with the at least one measure metric, wherein the fuzzy rule set defines a relationship of the fuzzy regions of the fuzzy data set to categories of computing system component health; and

third instructions for outputting the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set.

10. The computer program product of claim 9, wherein the at least one fuzzy data set is generated by performing data mining on metric history data, wherein the metric history data includes measured values for the at least one measured metric for a predetermined period of time.

11. The computer program product of claim 10, wherein the data mining includes performing statistical analysis of the metric history data to determine the distribution of the metric history data.

12. The computer program product of claim 9, further comprising:

fourth instructions for generating at least one second fuzzy rule set indicating a relationship of the health of the computing system component to the health of at least one other computing system component.

13. The computer program product of claim 9, further comprising:

fourth instructions for generating an indicator of the health of the at least one computing system component; and

fifth instructions for outputting the indicator.

15. The computer program product of claim 9, wherein the third instructions for determining the health of the computing system component based on the at least one fuzzy data set and the at least one fizzy rule set include:

instructions for applying the at least one fuzzy rule set to metric data collected by a metric data collection facility; and

instructions for determining a fuzzy data set in which the metric data is classified based on the application of the at least one fuzzy rule set.

16. The computer program product of claim 15, wherein the at least one fuzzy rule set includes at least one hedge and wherein the third instructions include instructions for applying at least one hedge algorithm associated with the at least one hedge to the metric data.

17. An apparatus for determining a health of a computing system component, comprising:

means for generating at least one fuzzy data set associated with at least one measured metric of the computing system component, wherein the fuzzy data set defines fuzzy regions indicating different categories of the measured metric;

means for generating at least one fuzzy rule set associated with the at least one measure metric, wherein the fuzzy rule set defines a relationship of the fuzzy regions of the fuzzy data set to categories of computing system component health; and

means for outputting the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set.

18. The apparatus of claim 17, wherein the at least one fuzzy data set is generated by performing data mining on metric history data, wherein the metric history data includes measured values for the at least one measured metric for a predetermined period of time.

19. The apparatus of claim 18, wherein the data mining includes performing statistical analysis of the metric history data to determine the distribution of the metric history data.

20. The apparatus of claim 17, further comprising:

means for generating at least one second fuzzy rule set indicating a relationship of the health of the computing system component to the health of at least one other computing system component.

21. The apparatus of claim 17, further comprising:

means for generating an indicator of the health of the at least one computing system component; and

means for outputting the indicator.

23. The apparatus of claim 17, wherein the means for determining the health of the computing system component based on the at least one fuzzy data set and the at least one fuzzy rule set includes:

means for applying the at least one fuzzy rule set to metric data collected by a metric data collection facility; and

means for determining a fuzzy data set in which the metric data is classified based on the application of the at least one fuzzy rule set.

24. The apparatus of claim 23, wherein the at least one fuzzy rule set includes at least one hedge and wherein the means for determining a fuzzy data set in which the metric data is classified includes means for applying at least one hedge algorithm associated with the at least one hedge to the metric data.

25. The computer-implemented method of claim 1 wherein the at least one measured metric is selected from the group consisting of processor utilization, page fault rates, number of threads, number of hits on a website, number of database queries, number of database connections, and combinations thereof.

26. The computer program product of claim 9 wherein the at least one measured metric is selected from the group consisting of processor utilization, page fault rates, number of threads, number of hits on a website, number of database queries, number of database connections, and combinations thereof.

27. The apparatus of claim 17 wherein the at least one measured metric is selected from the group consisting of processor utilization, page fault rates, number of threads, number of hits on a website, number of database queries, number of database connections, and combinations thereof.

EVIDENCE APPENDIX

There is no evidence to be presented.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings.